

### Abstract

An illumination system and exposure apparatus and method involving illuminating a surface over an illumination field (IF) having an arcuate shape. The illumination system comprises a light source (54) for providing a light beam (100), and an optical integrator (56). The optical  
5 integrator comprises a first reflective element group (60) having an array of first optical elements (E) each having an arcuate profile corresponding to the arcuate shape of the illumination field. Each of the first optical elements has an eccentric reflecting surface ( $RS_E$ ) comprising an off-axis section of either a spherical surface (S) or an aspherical surface ( $AS_E$ ). The array of first optical elements is designed so as to form a plurality of arcuate light  
10 beams (108) capable of forming a plurality of light source images (I). The illumination system further includes a condenser optical system (64) designed so as to condense said plurality of arcuate light beams to illuminate the surface over the arcuate illumination field in an overlapping manner.

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